July 2, 2019

Timothy Mulligan
Executive Vice President
MTA New York City Transit
2 Broadway, 30th Floor
New York, NY 10004

>   Re: **NYC Transit Fare Evasion Surveys:**
>   **OIG Concerns**
>   **MTA/OIG #2019-12**

Dear Mr. Mulligan:

In view of the heightened attention to fare evasion on both subways and buses and the associated revenue losses, the Office of the Metropolitan Transportation Authority Inspector General (OIG) examined the methods used by MTA New York City Transit or Transit to estimate the levels of fare evasion in its system. The use of sound, statistically valid methods is essential for producing reliable estimates of both the current levels of evasion and the trends over succeeding quarters and years.

We note that NYC Transit has recently taken multiple measures to control and reduce fare evasion. The impacts of these initiatives would be difficult to assess without reliable data on evasion levels and trends. We also note Transit has recently begun reporting its fare evasion estimates to the MTA Board, thus bringing much greater visibility to these figures. To our knowledge, these estimates previously had been internally held.

OIG reviewed Transit's Subway Fare Evasion (SFE) survey and Bus Fare Evasion (BFE) survey. Our review focused on the survey sampling methodologies: e.g. statistical assumptions, sample sizes, sample selection, confidence intervals, and margin of error formulas. We also learned about data collection practices: Traffic Checker instructions, scheduling process, and the actual data collected. We identified areas of concern in the decade-old design of both surveys, and in their respective data collection practices.

Working with Transit staff, we reviewed six quarterly SFE and BFE reports–from mid-2017 through the end of 2018–along with related information. We presented the concerns covered in this letter in a meeting with Transit Operations Planning staff on April 2, 2019. The staff recently informed us that many changes are under consideration in regards to the methodologies for both surveys.

As one broad point, we note that the SFE and BFE surveys each require Traffic Checkers to distinguish among numerous categories of system entry. Although some of this detail is useful for management decision-making, both surveys may benefit from simplification to make data collection less burdensome and thereby improve the accuracy of the overall fare evasion estimates.

This letter summarizes our major concerns and questions about each of the surveys that were shared orally with members of NYC Transit Operations Planning earlier this year.

BACKGROUND

Transit's Operations Planning Division (OP) conducts quarterly fare evasion surveys that produce statistical estimates of Bus Fare Evasion and Subway Fare Evasion. The Transit Office of Management and Budget (OMB) distributes these estimates in quarterly reports along with breakdowns by numerous subcategories. The OMB quarterly reports also provide several years of prior survey results along with the percentage point changes for recent periods. For each of the two surveys, Traffic Checkers collect the data using a stratified simple random sample.[1]

As with any statistical survey, the evasion surveys produce results that are only point estimates of the true population values. Of course, for fare evasion the true value is unknowable without doing an impossible 100 percent sample. And even then the results would be subject to data collection errors (non-sampling errors). To address the statistical uncertainty of a sample estimate, statisticians calculate the margin of error, using a formula based on the type of sample, the sample size, and the variability within the survey results. This error margin is then used to provide a confidence interval around the point estimate, usually tied to a 95 percent probability. Critically, a statistically valid margin of error formula is the basis for concluding whether the change from a previous period is statistically significant. In the fourth quarter of 2018, Transit reported that the quarterly subway fare evasion rate of 3.4% had a "standard 95% confidence interval of $\pm$ 1.22%." If the error margin is accurate, this means that the there is a 95 percent chance that the true value actually fell between 2.18% and 4.62%.

We will now discuss the two fare evasion surveys separately, beginning with the subway survey.

OBSERVATIONS

The Subway Fare Evasion (SFE) Survey

The SFE survey began around 2008, after MTA Audit Services found that fare evasion was much higher than the estimates produced at the time by Station Agents (2.1 percent vs. 0.32 percent). OP conducted a pilot study in which auditors measured fare evasion at randomly

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[1] To stratify means to divide the population into subgroups according to characteristic(s) believed significant and/or for which separate results are desired. Random samples are selected from each subgroup.

selected fare control areas (i.e., contiguous groups of turnstiles/gates within a station).

After analyzing the pilot study results, OP created a methodology for measuring fare evasion with a simple random sample of fare control areas stratified by 20 levels of activity (average ridership across fare control area and hour of day), two median income levels, and three parts of the week (weekday, Saturday and Sunday). Transit staff described the process in a 2011 paper.[2] OP later modified the stratification to use 40 levels of activity and the three parts of the week. (The sample is no longer stratified by median income level). OP randomly selects 280 location-time combinations to survey each quarter. It is important to note that in the six quarters OIG reviewed through the end of 2018, OP completed an average of only about 168 of those surveys (60 percent).

The SFE survey has not had specific, designated Traffic Checkers who perform the work. On a given day, the responsible manager told us he assigns one available Checker from the team of 26 to perform the scheduled SFE surveys. This uniformed Checker monitors sampled fare control areas for 30-minute periods, recording observations on a computer tablet or paper form. The Checker is responsible for accurately tallying 20 types of entry, including:

- Illegal entries (e.g. opportunistic entries through an open exit gate);
- Questionable entries (e.g. passengers entering through a gate with questionable agent authorization);
- Legal entries not captured by the automated fare collection (AFC) system (e.g. agent-authorized entry by fare-paying persons with bulk items).

The Checker manager told us that at fare control areas with multiple exit gates, Checkers are instructed to pick one of the gates to observe and to ignore the other gate(s).

One analyst involved in the original survey design suggested that OP saw the project as an internal management tool to get an estimate of the problem, not an official analysis whose results would be formally reported to the MTA Board or considered a robust and reliable estimate of revenue loss. He said OP made some methodological decisions based on practical limitations and available resources, but in hindsight it appears that some of the statistical assumptions about the nature of fare evasion should have been validated more thoroughly. While the initial process may well have been sufficient for the needs of the time, the SFE survey has become a project with larger implications. Moreover, current OP staff "inherited" the sampling methodology and were not fully aware of the rationale behind it.

OIG has a number of questions and concerns about the SFE survey. These are as follows.

Concerns About Survey Design:

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[2] AV Reddy, J Kuhls, A Lu. (2011). Measuring and Controlling Subway Fare Evasion. *Transportation Research Record: Journal of the Transportation Research Board*, No. 2216. Transportation Research Board of the National Academies: Washington, D.C. pp. 85–99. DOI: 10.3141/2216-10.

1. Through the third quarter of 2018, the margin of error cited in OMB's SFE quarterly reports (±0.2 percent) came from the stratified simple random sampling method described in the 2011 methodology paper. This approach viewed fare evasion as a phenomenon represented by a binomial distribution.[3] During our review, OP told us it had recently begun to consider whether it would be more appropriate to assume that the proportion of evaders is *clustered* rather than *uniform*, the latter being an assumption of the binomial distribution. In February 2019, OMB released the 4th Quarter 2018 SFE report with new and larger error margins based on a revised formula that is used for clustered sampling methods. However, OP still uses the same simple random sampling method, which may require adjustments to fit the requirements of a clustered sampling method. More review and validation of the sampling method and margin of error formula may be necessary.

2. As noted, OP completed only about 60 percent of surveys in the period of our review. In the fourth quarter 2018 Survey, OP completed less than 50 percent.[4] Important questions include: What is the impact of this shortfall on the accuracy of the estimates, and thus their representativeness of the entire population of riders? Also, do the missed surveys bias the results (e.g. by disproportionately occurring in certain areas or times of day)?

Concerns about Data Collection Practices:

1. Certain fare control areas have multiple banks of turnstiles and/or visual obstructions that make it difficult to see all gates/turnstiles from any given vantage point. Is it reasonable to expect reliable data from a single Traffic Checker at such complex control areas, especially given the detailed categorization required?

2. The instruction to Checkers to watch a single gate in a fare control area with multiple gates would typically lead to undercounting illegal gate entries. This approach appears arbitrary and we also note that the methodology does not include a factor to compensate for this.

3. OP has not created a manual with instructions for SFE Traffic Checkers. It seems clear that such an important and relatively complex survey should have a standard set of written instructions for training and reference.

4. SFE Traffic Checkers are required to wear MTA uniforms (BFE checkers are not.). Has OP analyzed the impact of the presence of uniformed personnel on evasion behavior?[5]

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[3] A binomial distribution is used to estimate the probable outcomes of a series of events such as coin tosses when each event has two possible outcomes. However, the binomial distribution is based on assumptions--such as the independence of each event--that are questionable when applied to fare evasion. In fact, it appears likely that passenger decisions are not always independent but are subject to influence by the behavior of other passengers.
4 We based these percent-completed figures on the reported *"Total Number of Six Minute Periods Observed,"* dividing by five to estimate the number of 30-minute periods.

[5] In April 2019, OP told us it has a plan to create a separate cadre of Checkers who would work only on fare evasion surveys. OP said this would eliminate the requirement for SFE Checkers to wear uniforms.

5. Currently, SFE Traffic Checkers have limited availability, are shared with other surveys, and often can't be substituted for in their absence. If a Checker leaves the job or is out long-term, his/her position cannot be filled until the following pick. These constraints have a direct impact on the number of checks completed, which affects the sample's statistical validity when applied to the population as a whole.

The Bus Fare Evasion (BFE) Survey

The BFE survey began around 2008, as part of OP's effort to report ridership and daily bus passenger-miles to the Federal Transit Administration (FTA). At the time, NYCT was seeking FTA's approval for a way of estimating bus passenger-miles using AFC data. Because AFC data only captures paying customers, OP designed a survey to estimate what proportion of riders do not interact with the farebox (e.g. fare evaders, children riding free with an adult, uniformed officials using a flash-pass). Using the results of this survey, OP was able to estimate a system-wide fare evasion rate. OP staff described the process in a paper published in 2011.[6]

Around 2011, OP revised the methodology in order to produce borough-level estimates of fare evasion. In its current form, the BFE methodology uses a simple random sample stratified by day type (weekday, Saturday and Sunday) and by borough. Transit's BFE survey covers only Regular Bus Service (RBS), excluding certain types of RBS (e.g. school trips, very late night trips). The survey also excludes Express Bus Service, Select Bus Service (SBS), and MTA Bus. Transit's Eagle Teams have a distinct method for estimating fare evasion on SBS. This Eagle Team effort is separate from the BFE survey.[7] MTA Bus Operations Planning does its own BFE survey for MTA Bus local buses. MTA Bus officials told us they follow Transit's BFE survey procedures.

Traffic Checkers ride on the sampled buses and record each boarding under one of 13 different categories of legal or illegal entries. In addition to three categories of MetroCard/coin payments, legal entries include multiple types of flash passes, badges, and passengers in uniform. Illegal entries include front door evaders, rear door boardings, and multiple types of incomplete payments.

At the beginning of each Bus Operator pick, OP selects a random sample of bus trips to survey. Because calendar quarters do not usually align with the periods of Bus Operator picks, OP aggregates surveys from multiple picks to produce quarterly estimates of fare evasion. OP says the sample it draws is about double what it needs to produce a statistically valid estimate. The

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[6] A Lu, A Reddy. (2011). Algorithm to Measure Daily Bus Passenger Miles Using Electronic Farebox Data for National Transit Database Section 15 Reporting. *Transportation Research Record: Journal of the Transportation Research Board*, No. 2216. Transportation Research Board of the National Academies: Washington, D.C. pp. 19–32. DOI: 10.3141/2216-03.

[7] For the first time, OMB's BFE report for the 4th quarter of 2018 included a separate line for the Eagle Team's SBS evasion estimate as well as merged figures for RBS and SBS.

methodology for determining the sample size in each pick has undergone changes during the time of our review.

Again, OIG has a number of questions and concerns to raise about the BFE survey. These are described below.

Concerns About Survey Design:

1. The sample selection is not fully random because, for practical reasons, each sampled trip is paired with a return trip on the same route. Also, the sample is built around Bus Operator picks, which do not correspond to the quarterly reporting period. The results from one quarter, therefore, actually include observations from two or three different random samples. OP should assess what implications these factors have on the margin of error.

2. OP told us that it completed 321 samples in the 4th Quarter 2018. In quarters when OP does not complete its full sample, is there statistical bias (day of the week, time, geography, etc.) in which surveys are omitted? Such bias would affect the sample's representativeness of the full population of riders.

3. The margin of error calculation (used for many years to determine the target sample size) assumed that fare evasion events are independent and identically distributed within each stratum, e.g. the method implicitly assumed that all weekday trips in Manhattan have the same evasion rate regardless of route or time of day. This assumption seems questionable given that, empirically, certain routes are known to have significantly more fare evasion than others within the same borough and day of week. This may have led OP to draw an insufficient number of samples and/or overstate the accuracy of the estimates. OP recently changed the BFE's margin of error formula to follow the SFE group's new cluster formula described above. Is the new margin of error formula now compatible with the longstanding approach to sampling and data collection, which OP has not revised? More review and validation of the sampling method and margin of error formula may be necessary.

4. In order to determine how many bus trips must be surveyed to obtain the target number of boardings, OP uses estimates of the average number of passengers per bus trip ("load factor") in each borough. However, OP does not calculate separate load factors for weekday/Saturday/Sunday, even though the 15 strata are so differentiated. Furthermore, OP bases the load factors on results from past BFE surveys, which represent a relatively small number of trips. Has OP considered calculating load factors with AFC data covering all bus trips in a given stratum (adjusted for average fare evasion)?

5. Express bus service is not covered by any of the fare evasion surveys. OP excluded express bus routes from the BFE survey in 2014 (because express bus fare evasion had been relatively low) but OMB did not footnote the change or adjust the prior-year estimates shown in the subsequent quarterly reports.

Concerns about Data Collection Practices:

1. Traffic Checker availability issues make it difficult to cover all sampled trips: OP has only six dedicated BFE Checkers, whose shifts can only include only one weekend day. OP expects around 20 percent Checker unavailability. If a Checker leaves or is out for a prolonged period, her/his position cannot be filled until the following pick. At the end of the last 2018 pick, only four BFE Checkers remained out of the six. The Checkers' schedules also prevent sampling any bus trips occurring very late at night.

2. Can one Checker accurately monitor all-door evasion, especially on more crowded buses, and given the detailed categorization required? OP acknowledged that it can be difficult to monitor both front and rear doors, and three-door articulated buses are particularly challenging. In some situations, it can be hard for a Checker to hear the distinct tone the farebox produces to indicate an invalid MetroCard or incomplete fare payment. In addition, "short drops" (the payment of less than full fare) can be hard to detect because the Operator does not always press the reset button.
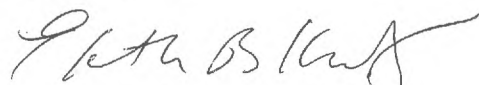
Question Raised by Operation Planning

An OP manager raised the concern that methodological changes to the surveys might make new results not comparable to past estimates. He said this could pose difficulties when there is so much focus on the trends and how they relate to changes in enforcement and other new strategies. Other OP staff responded that methodological changes might primarily affect the error margins, and the new methods could still produce point estimates that are generally comparable to past results. OIG believes that if Transit makes sampling and data collection changes that substantially affect the point estimates, it would still be beneficial to have more accurate results. In any case, future reports could reference the changes, and in the long run it would be preferable to have more confidence in the reported trends.

To that end, we encourage MTA New York City Transit to undertake a thorough review of the survey design methodologies and data collection practices used in its bus and subway fare evasion surveys and revise them as necessary to provide reliable estimates and trends. Such a review may require appropriate consultant resources due to its complexity, but the need to have confidence in fare evasion statistics is critical.

As always, we appreciate the courtesy and cooperation afforded to us by NYC Transit staff. If you have any questions please do not hesitate to call me at (212) 878-0022.

Very truly yours,

Elizabeth Keating
Executive Deputy Inspector General

MTA New York City Transit

August 30, 2019

Elizabeth Keating
Executive Deputy Inspector General
One Penn Plaza, 11th Floor
New York, NY 10119

**Re: NYC Transit Fare Evasion Surveys: OIG Concerns
MTA/OIG #2019-12**

Dear Ms. Keating:

This is in reply to the MTA Office of the Inspector General's audit of New York City Transit's Fare Evasion Survey preliminary findings letter dated July 2, 2019. New York City Transit Operations Planning (NYCT OP) has reviewed the letter and appreciates the insights and information provided by the MTA OIG. NYCT OP has been actively bolstering the fare evasion monitoring program and improving the methodology of its surveys. At the December 2018 Finance Committee meeting, NYCT stated that observed evasion rates likely constitute an undercount due to the human factors which make fare evasion monitoring challenging, which the MTA OIG's findings confirm. Recently implemented and planned upgrades to fare evasion monitoring address issues confirmed by MTA OIG, and actually go beyond the MTA OIG's recommendations.

The two sections below outline changes being made to fare evasion monitoring at NYCT, starting with subway and then buses.. Specific MTA OIG findings are referenced throughout.

The Subway Fare Evasion (SFE) Survey

NYCT OP has sought to improve the monitoring of subway fare evasion by:

Reallocating additional resources to evasion monitoring and changing the way checks are assigned to checkers to improve efficiency

Historically, SFE observations were made by members of the Passenger Environment Survey (PES) checker cadre, though the checkers in this team spent most of their time on PES checks. In order to provide more frequent and precise updates on SFE, NYCT OP reassigned staff previously assigned to PES checks to SFE this past spring. As of July 2019, broader

reassignments were made with the new pick, enabling the establishment of a combined subway and bus fare evasion cadre, with several times more checkers assigned to fare evasion and with checkers exclusively devoted to fare evasion monitoring as opposed to splitting their time with other duties. Additionally, changes to the way checks are assigned should substantially increase the proportion of checkers' time spent monitoring evasion, as opposed to moving between observation locations. With the increased scale, schedulers can now often assign checkers to multiple nearby locations (before, the smaller number of checks each day were intentionally spread out). This increased efficiency enables the checks themselves to double in length from 30 minutes to 60 minutes.

In combination, these changes should both lower the needed number of checks to obtain the same level of precision (due to the longer checks) and increase the number of checks performed (due to the reallocated resources), directly addressing the MTA OIG's concerns regarding sample completion [Concerns about SFE Survey Design: 2]. Sharing resources between SFE and BFE enables schedulers to better respond to long term absences, another concern MTA OIG had raised [Concerns about SFE Data Collection Practices: 5].

Additionally, the formation of a dedicated fare evasion cadre enables the checkers to operate without uniforms, directly addressing MTA OIG's concerns about the presence of uniformed staff impacting evasion rates [Concerns about SFE Data Collection Practices: 4]. Prior to July 2019, SFE checkers wore uniforms because their other checks required them.

Updating the list of Fare Control Areas (FCAs) drawn from in samples to ensure more accurate counts and make it easier for checkers to locate FCAs

In response to recent construction, as well as feedback from checkers and their supervisors, NYCT OP worked with the Automated Fare Collection (AFC) back office and NYCT Office of Management and Budget (OMB) to create a new expanded list of fare control areas (FCAs) that splits out over a hundred additional FCAs. These additional FCAs enable checkers to have better sightlines and hence to collect more accurate data. This addresses sightline concerns expressed by the MTA OIG [Concerns about SFE Data Collection Practices: 1].

Additionally, checkers are now provided with more guidance to locate their assigned FCA, including, when available, a list of all the labels they will find on gates in the FCA. Checkers are instructed to count entries through all gates in their FCA, contrary to the concern expressed by MTA OIG [Concerns about SFE Data Collection Practices: 2].

Reducing the level of complexity and ambiguity in the fare evasion survey by simplifying it

In response to feedback on the complexity of checks from checkers and their supervisors, OP reached out to other departments and developed a consolidated set of categories which still satisfy requirements for reporting to the MTA Board as well as the Federal Transit

Administration, without the need to make difficult and unnecessary distinctions (e.g., which key was used to open a gate, whether evasion through a gate was "opportunistic" or "deliberate"). This consolidation should enable checkers to focus on identifying evasion as opposed to trying to discern the details of a particular evader's behavior. The new categories a became effective in July 2019. This addresses concerns regarding complexity expressed by MTA OIG [Concerns about SFE Data Collection Practices: 1]. It is important to note that while some categories used prior to July were difficult to differentiate, they were added together before being reported, which mitigated the impact on results.

Improving the level of training and guidance provided to checkers

As a complement to the simplification of SFE categories monitored by checkers, all checkers in the newly formed SFE/BFE cadre underwent an intensive training (or were retrained) during the first two weeks of July. They were given both classroom and field training on the fare evasion monitoring process, including the newly simplified set of categories. Newly updated paper forms include notes to remind checkers of the new category definitions. OP agrees that having additional written documentation could be helpful for checkers and is currently in the process of developing it. These improvements address concerns on training and documentation raised by MTA OIG [Concerns about SFE Data Collection Practices: 3].

Increasing the sophistication of data validation applied to observation results

NYCT OP continuously seeks to improve the quality of SFE results. Toward that end, OP analysts have developed automated reports to catch potential data issues and flag them for manual review. OP continues to develop and refine these reports as the scale and nature of the monitoring process evolves. While the data itself cannot validate improved tracking of fare evasion, since we do not have the true population fare evasion rate to compare to, we do hope that the changes we made to parts of the sampling process result in a lower margin of error. We are able to directly observe and track this, and we will continue to monitor it over time.

Intensifying field supervision to ensure accurate data collection

NYCT OP has increased the number of SFE/BFE supervisors from 1 to 3, and will increase to 4 supervisors effective in September 2019. Supervisors' shifts will cover 24 hours a day, 7 days a week, visiting checkers in the field and conducting parallel checks to ensure data quality. Additionally, supervisors follow up on reports of problems collecting data. NYCT OP is also exploring additional means of supervision, including the tracking of AFC swipes of checkers to ensure they are at the correct FCA at the correct time and the use of video to confirm results.

The Bus Fare Evasion (BFE) Survey

NYCT OP has sought to improve the monitoring of bus fare evasion by:

Shifting additional resources to BFE monitoring and forming a dedicated evasion cadre

As discussed above, OP has increased the number of checkers conducting fare evasion surveys and formed a dedicated SFE/BFE cadre. The additional checker resources allow more flexibility for scheduling when there are long-term absences and should improve sample completion. This addresses concerns regarding checker availability raised by MTA OIG [Concerns about BFE Data Collection Practices: 1].

Reducing the level of complexity and ambiguity in the fare evasion survey by simplifying it

Similar to the effort described above for the subway fare evasion survey, OP has reached out to other departments and developed a consolidated set of categories which still satisfy requirements for reporting to the MTA Board as well as the Federal Transit Administration, without the need to make difficult and unnecessary distinctions. This simplification of the survey should enable checkers to better focus on identifying evasion. The new categories are expected to be implemented this year. This addresses concerns regarding complexity expressed by MTA OIG [Concerns about BFE Data Collection Practices: 2].

Revising the sample generation process to improve completeness and balance

NYCT OP is still revising the approach for generating a sample of trips to observe, with the goal of fully sampling those trips identified, recognizing practical constraints will sometimes prevent small numbers of samples from being observed (e.g., station closures, changes to staff availability). Improvements could include better alignment with the SFE process and the MTA Bus monitoring process. MTA OIG also expressed some concerns around the use of picks to define sample sets of trips [Concerns about BFE Survey Design: 1]. The sample has been built around bus operator picks due to realities that go beyond the scope of fare evasion monitoring. Sample trips from one pick simply may not exist in another, making insistence on purely monthly or quarterly samples problematic even if desirable from a purely statistical viewpoint.

Increasing the sophistication of data validation applied to observation results

As with SFE, NYCT OP has been continuously seeking to improve the quality of BFE results. Toward that end, OP analysts have developed automated reports to catch potential data issues and flag them for manual review. OP continues to develop and refine these reports as the scale and nature of the monitoring process evolves. Also, as with SFE, while the data itself cannot validate improved tracking of fare evasion, since we do not have the true population fare evasion rate, we hope that the changes to the sampling process result in a lower margin of error. We can directly observe and track this, and we will continue to monitor it over time.

In addition to validation for the purpose of deciding whether to exclude bad data, OP is exploring creating reports to provide feedback to schedulers on the balance of samples completed across boroughs. This would address concerns of the potential for bias expressed by MTA OIG [Concerns about BFE Survey Design: 2].
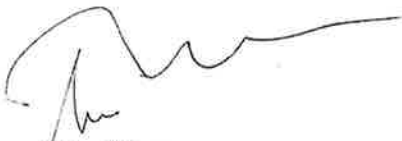
Exploring alternative approaches to collecting and validating results

As with large FCAs in the subway, crowded articulated buses can pose sightline problems for checkers. NYCT OP recognizes that this can result in an undercount of evasion, and made this general point publicly in the December 2018 presentation to the Board Finance Committee. NYCT OP is considering other approaches for collecting and validating these counts, including the use of multiple checkers per bus and the use of video. This addresses concerns regarding sightlines expressed by MTA OIG [Concerns about BFE Data Collection Practices: 2].

Intensifying field supervision to ensure accurate data collection

The same supervisors monitor BFE and SFE, so the same upgrades still apply. As stated above, NYCT OP increased the number of SFE/BFE supervisors from 1 to 3, and will increase to 4 supervisors effective in September 2019. Supervisors will cover 24 hours a day, 7 days a week visiting checkers in the field and conducting parallel checks to ensure data quality. Additionally, supervisors follow up on reports of problems collecting data. NYCT OP is also exploring additional means of supervision, including the tracking of AFC swipes of checkers to ensure they are on the correct bus at the correct time and the use of video to confirm results.

Sincerely,

Tim Mulligan
SVP Operations Support

cc: Andy Byford
        Judith McClain